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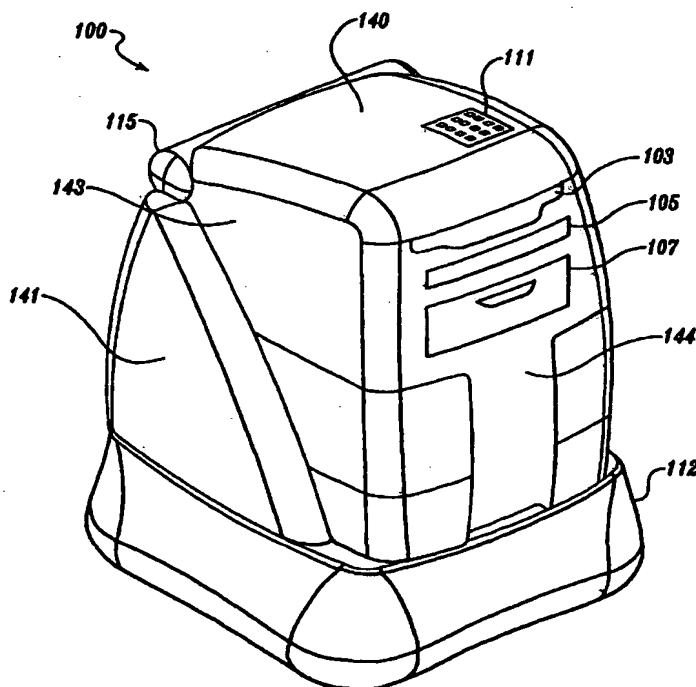
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(54) Title: SECURE DELIVERY RECEPTACLE AND METHOD FOR USING THE SAME



(57) Abstract: The delivery receptacle (100) comprises a first compartment, wherein the first compartment includes an enclosure and a first opening (105) configured to receive delivery items. The delivery receptacle also comprises a second compartment, wherein the second compartment includes a secured enclosure that is separate from the first compartment and a second opening (107) for receiving delivery items. The second compartment is accessible by a security system that limits access to the second compartment, where the access may be limited to a plurality of couriers and a delivery item recipient. The delivery receptacle also comprises a primary opening configured to provide access to the first and second compartments, where the primary opening is sized and configured to allow passage of delivery items in and out of the first and second compartments. Further is disclosed a tracking and managing method comprising receiving order information from a computing device associated with a commerce entity wherein the ordering information describes shipping information of a delivery item and information related to a purchase of a

delivery receptacle, providing the delivery receptacle to a consumer entity, determining if the delivery receptacle is received by the consumer entity, and activating an account of said consumer entity, if said delivery receptacle is received by the consumer entity.

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## **SECURE DELIVERY RECEPTACLE AND METHOD FOR USING THE SAME**

### **Cross-Reference to Related Application**

This non-provisional application claims the benefit under 35 U.S.C. § 119(e)  
5 of U.S. Provisional Application No. 60/169,831, filed on December 8, 1999, and  
titled "SECURE DELIVERY RECEPTACLE AND METHOD FOR USING THE  
SAME," the subject matter of which is specifically incorporated herein by reference.

### **Field of the Invention**

The present invention relates to a method and a delivery system, and more  
10 specifically, the present invention relates to a secure delivery receptacle and a  
method for using the same.

### **Background of the Invention**

Known delivery receptacles are designed to solve various problems  
associated with the delivery services. For example, Worden (U.S. Patent  
15 No. 5,573,178) discloses a mail and newspaper delivery system for receiving parcels  
mailed by a government postal authority and for receiving direct delivery items. In  
addition, Hicks (U.S. Patent No. 4,602,721) discloses a multiple access newspaper  
receptacle that comprises a housing having dual entry access to the hollow chamber  
of the housing. As shown in these patents, in addition to the referenced patents in  
20 each above-referenced patents, delivery receptacles known in the art have been, for  
the most part, sufficient for services associated with the transfer of delivery items.

For some time, certain government regulations have been one principal  
deterrent protecting delivery items from theft and vandalism. Although existing  
regulations have provided some security to delivery items received and stored in

receptacles, such as a mailbox, this primary deterrent is ineffective in protecting delivered items in all situations. For example, when large delivery items are transferred to a residence, the parcel is often too large to fit into a mailbox and, thus, is left in a hidden area or on a doorstep. In this situation, delivery items are not  
5 secured during the delivery process and subject to theft or vandalism. As a result, couriers are often forced to repeatedly return to a residence in order to carry out a person-to-person delivery for added protection of the delivery item. As known in the industry, repeated deliveries caused by missed person-to-person delivery attempts, as an effort to provide secured deliveries, is an inefficient process.

10 With the recent growth of commerce items purchased over the Internet and the rapid growth in the shipping industry, the above-described security problem is exacerbated yet even further. Therefore, in light of the foregoing, there is a need for a secure delivery receptacle and a system and method to facilitate secure delivery services.

15 In addition to the various security issues illustrated in the above-described examples, it is known that delivery receptacles are not equipped to accommodate the new shipping methods spawned by the growth of the Internet. For example, in the delivery of grocery items, common delivery receptacles do not provide any added protection to prevent decomposition of perishable goods. Thus, there is a need for  
20 delivery receptacles to accommodate more nontraditional delivery items.

#### Summary of the Invention

The present invention relates to a delivery receptacle system, and a method for using the same. In one embodiment, the delivery receptacle comprises a first compartment, wherein the first compartment includes an enclosure and a first  
25 opening configured to receive delivery items. The delivery receptacle also comprises a second compartment, wherein the second compartment includes a secured enclosure that is separate from the first compartment and a second opening for receiving delivery items. The second compartment is accessible by a security system that limits access to the second compartment, where the access may be limited to a  
30 plurality of couriers and a delivery item recipient. The delivery receptacle also comprises a primary opening configured to provide access to the first and second compartments, where the primary opening is sized and configured to allow passage of delivery items in and out of the first and second compartments.

In another embodiment, the delivery receptacle further comprises a third and  
35 fourth compartment for receiving delivery items. The third and fourth compartments

are separate from each other and accessible by individual openings associated with each compartment. In addition, the third and fourth compartments are both accessible by the primary opening.

5 In yet another embodiment, the present invention provides a delivery receptacle that comprises a housing constructed of a back wall, two lower side walls, two upper side walls, a front wall, a top portion and a base. In this embodiment, the back wall is formed with the lower side walls and a divider to form a first and second compartment. In addition, the back wall and the two lower side walls are affixed to the base for security. The top portion is formed with the two upper side walls which  
10 create a secured enclosure for the first and second compartments. The back wall is pivotally secured to the top portion to create the primary opening in the front of the delivery receptacle. The primary opening is configured to open in an upright direction to provide ergonomic benefits during operation.

In yet another embodiment, the present invention provides a tracking and  
15 inventory management system and method. The method of the present invention comprises the steps of receiving order information from a computing device associated with a commerce entity wherein the ordering information describes shipping information of a delivery item and information related to a purchase of a delivery receptacle, providing the delivery receptacle to a consumer entity,  
20 determining if the delivery receptacle is received by the consumer entity, and activating an account of said consumer entity, if said delivery receptacle is received by the consumer entity.

In yet another embodiment of the present invention, the method of the present invention provides a system and method for tracking and managing the transfer  
25 process of delivery items. In this embodiment, the method provides a plurality of transactions for providing royalty based revenue for an entity that is associated with the delivery receptacles.

#### Brief Description of the Drawings

30 The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same become better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

FIGURE 1A-1C are perspective and side views of one embodiment of a delivery receptacle in accordance with the present invention.

FIGURE 2 is a cut away perspective of the delivery receptacle depicted in FIGURES 1A-1C illustrating various features associated with the delivery receptacle.

FIGURE 3 is a block diagram of one embodiment of a security system utilized with the delivery receptacle in accordance with the present invention.

5       FIGURE 4 is a block diagram of one embodiment of a remote notification and alarm system utilized with the delivery receptacle in accordance with the present invention.

FIGURES 5A-5B is a block diagram of another embodiment of a security system having handheld remote devices, in accordance with the present invention.

10       FIGURE 6 illustrates a front view of another embodiment of a delivery receptacle having a mail slot affixed to the top of the receptacle housing.

FIGURE 7 illustrates a front view of another embodiment of a delivery receptacle having a single compartment.

15       FIGURE 8 illustrates a front view of another embodiment of a delivery receptacle having five internal compartments.

FIGURE 9 illustrates a side view of another embodiment of a delivery receptacle having a mounting fixture.

FIGURE 10 is a block diagram illustrating several of the components of a client device.

20       FIGURE 11 is a block diagram illustrating several of the components of a Web server.

FIGURE 12 is a flow diagram of a method for delivering a receptacle and a delivery item in accordance with another aspect of the present invention.

25       FIGURE 13 is a flow diagram of a method for transporting delivery items in accordance with another aspect of the present invention.

#### Detailed Description of the Preferred Embodiment

FIGURES 1A and 1B are perspective and side views of a secured delivery receptacle 100 for receiving U.S. mail and large delivery items. The delivery  
30       receptacle 100 comprises a base 112, a top portion 140, a front wall 144, two upper side walls 143 and 153, two lower side walls 141 and 149, and a back wall 159. The back wall 159 is configured with the two lower side walls 141 and 149 to form the bottom portion of the delivery receptacle 100. The back wall 159 and the two lower side walls 141 and 149 are mounted on the top of the base 112. The top portion 140  
35       is configured with the two upper side walls 143 and 153 to create a lid which

provides a secure enclosure inside the delivery receptacle 100. The top portion 140 is pivotally secured to the back wall 159 by a hinge device 115. As shown in FIGURE 1B, the two lower side walls 141 and 149 and the back wall may be configured with a divider 125 to create two separate compartments in the delivery receptacle 100. The first compartment is denoted by reference number 120 and the second compartment is denoted by reference number 121.

FIGURE 1C is a side view of the delivery receptacle 100 depicted in FIGURES 1A-1B showing the lid in an open position. As shown in FIGURE 1C, the divider 125 creates a boundary for keeping delivery items in the upper compartment 120 from entering the lower compartment 121. Also shown in FIGURE 1C, the lid (also referred to as the primary access or primary opening) can be opened to allow access to the two internal compartments 121 and 120.

The delivery receptacle 100 also comprises a latch handle 103, a first opening 105, such as a mail slot, and a second opening 107. In addition, the delivery receptacle 100 comprises an electronic security mechanism for providing limited access to the receptacle 100. As will be described in more detail below with reference to FIGURES 3, 4, and 5A-5B, the electronic security mechanism is configured with one or more security access codes to allow access to the delivery receptacle 100. In addition, a mechanical key device may be used in conjunction with, or in addition to, the electronic security mechanism to allow access to the delivery receptacle 100. Once the electronic security mechanism allows access to the delivery receptacle 100, a user may access the compartments 121 and 120 of the receptacle 100 by lifting the latch handle 103.

Delivery items may be deposited into the delivery receptacle 100 by the two openings 105 and 107. The first opening 105 is configured for the delivery of small parcels such as a letter or thin envelope. The first opening 105 provides access to the first compartment 120. One exemplary purpose of the first opening 105 is to provide access to a carrier associated with the United States Post Office. The first opening 105 may be configured with a permanently open slot, an unlocked hinged door, or a locking door which may require an electronic combination or mechanical key for access to the first compartment 120.

The second opening 107 allows access into the second compartment 121. The second opening 107 may be in the form of a hinged door having a larger size than the first opening 105. In one embodiment, the second opening 107 may be as large as four inches tall and fifteen inches wide for receiving appropriately sized

delivery items. The second opening 107 may be secured with a door that may be controlled with a security system to limit access to the second compartment 121. This embodiment involving the separate compartments is designed to separate the delivered parcels in the second compartment 121 from the delivered parcels in the first compartment 120, a feature required by federal regulations.

As described in more detail below, with reference to FIGURE 3, one embodiment of the security system of the present invention comprises a processing component (not shown) and a keypad (111 of FIGURE 1A) for receiving key code combinations from a user. In one embodiment, the security system may be configured to allow one user to access the second opening by the use of a first key code, and allow another user to access the primary access by the use of a second code.

The housing of the delivery receptacle 100 is opaque allowing for insulation features and to obscure the contents stored therein. The housing of the delivery receptacle 100 is constructed of a material having weather-proof and water tight characteristics, such as polycarbonate. In addition, as shown in FIGURES 1A-1C, the curvature of the delivery receptacle 100 housing provide additional weather-proofing benefits. Other plastics known to in the art may be used for the construction of the delivery receptacle 100 housing. In alternate embodiments, plastics may be selected to provide a rigid exterior shell.

In one embodiment, the base 112 is made of a plastic, metal or like material having a rigid or semi-rigid characteristic. In addition, one embodiment of the base 112 is formed to have a hollow interior so the base 112 can receive and retain a weighted material such as sand or water. For example, the base 112 is designed to hold at least sixty-five to one hundred pounds of water or sand, which functions as an anti-theft ballast weight. If additional ballast weight is desired, the base 112 may be filled with a higher density material such as lead shot, or another like material. In one optional embodiment, the shape of the base 112 is of a curved shape and constructed with a low-friction material to make the base 112 and the delivery receptacle 200 difficult to grasp or lift.

In another alternative embodiment, as shown in FIGURE 2, the base 112 also comprises a bladder 231 internal to the base housing. The internal bladder 231 is configured to receive and retain a weighted material, such as water or another liquid solution. In addition, the internal bladder 231 is constructed with a flexible material to allow the internal bladder 231 to expand or contract in conditions of varying



temperatures. If water is used, a chemical antifreeze solution may not be necessary because the internal bladder 231 is designed to allow for freeze expansion of the water without compromising the structural integrity or functionality of the delivery receptacle 100. In one embodiment, the interior base 112 is sealed with a funnel cap (not shown) located on the top of the base 112.

Referring now to FIGURE 2, another embodiment of the delivery receptacle 200 is illustrated and described. FIGURE 2 illustrates the delivery receptacle 200 with the lid 251 in an open position to demonstrate how the internal compartments can be accessed by the primary opening. In addition, FIGURE 2 illustrates the construction details of the delivery receptacle 200, exemplary circuitry modules 212, and examples of other features of the delivery receptacle 200.

As shown in FIGURE 2, one embodiment of the housing of the delivery receptacle 200 is constructed with double wall design to create an open interior in the wall. The wall interior is filled with an insulating material 220 such as styrene or closed cell polyfoam. In another embodiment, the delivery receptacle may be constructed with a single wall design, where the housing of the delivery receptacle may be constructed with an insulating material.

The delivery receptacle 200 can also include a cooling mechanism (not shown), such as a mechanical refrigeration device or a block of dry ice or Blue Ice™, which can be mounted to mounting lugs 222. The insulation and cooling mechanism provide protection for cold or refrigerated items that are to be stored in the receptacle 200. For added protection, rigid insulating material may be mounted in the delivery receptacle in combination with or in substitution for the mechanical refrigeration device.

Also shown in FIGURE 2, and described above with reference to FIGURE 1A, the base 208 has a hollow portion configured to receive a weighted material such as water, sand, or any other material having consistency to allow the filling of the base 208. Reference numeral 231 indicates a hollowed interior of the base 208 that is filled with a dense material such as sand or water.

In the embodiment of FIGURE 2, an eyelet is molded into the base 208 and used as an attachment point for a security cable 232. The opposite end of the cable 232 can be secured to a wall, post, tree, or other fixed objects. The cable 232 may also be used to secure a bag (not shown) constructed of nylon, wire mesh, cotton duck, reinforced plastic sheeting, or similar material that would be difficult to cut.

The bag material is opaque and moisture resistant and used for storing additional

items. In other embodiments, additional mounting security features are added, such as a bolt or cork screw, to secure the delivery receptacle 200 to a desired location.

Also shown in FIGURE 2, another alternative embodiment of the receptacle 200 includes eyelet 233 is molded in the receptacle interior 211. The interior eyelet 233 is used to affix a cable 234 having a ring 235. The interior eyelet 233, cable 234 and ring 235 may be used by a user of the receptacle for added security. For instance, when a courier delivers a delivery item to the receptacle, the courier may insert the delivery item into a security bag and lock the bag to the cable 234 and ring 235 by the use of a locking mechanism. This embodiment provides added security in a situation where multiple couriers have access to one internal compartment of the delivery receptacle.

The locking device, utilized in the embodiment having the interior eyelet 233, may be made from any locking device such as a mechanical key padlock or an electronic device for allowing selective access. The security bag may be made constructed of nylon, wire mesh, cotton duck, reinforced plastic sheeting, or similar material that would be difficult to cut.

FIGURE 2 also illustrates a hollow cavity 211 in the receptacle 200 that may be divided by a plastic or metal divider (not shown), wherein the divider may be supported by brackets 210. In addition, the receptacle may comprise electronic modules 212 to provide a convenient housing for the circuitry that facilitates the security, locating, and alarm features described below. Details of the electronic components are described in more detail below. Also shown in FIGURE 2, a lock cover 250 shows the orientation and location of the security system having a mechanical latch to secure the lid in a closed position. The orientation and location of the first opening 105 is also illustrated in FIGURE 2, which is oriented on the front wall:

The exemplary circuitry modules 212 depicted in FIGURE 2 operate as the housings for the various circuits described below. As described in more detail below, the system of the present invention provide various alarm, notification, locator, and data communication capabilities. The modular design of the circuitry modules 212 allow a user of the receptacle to select a function housed in a particular circuitry module 212 and activate the desired function by simply inserting the circuitry module 212 into the receptacle 200.

The present invention provides several embodiments of a security system to limit the access and entry into the delivery receptacle 100. In addition, the present

invention provides several mechanisms for a locating system to help the delivery couriers locate the delivery receptacle. As described in more detail below, with reference to FIGURES 3, 4, 5A and 5B, electronic and mechanical keys may be used by a plurality of couriers and a delivery item recipient to access the box through the various openings. For instance, a first courier, such as Federal Express®, may be given access to the delivery receptacle by the use of a key code combination provided for that particular courier entity. In addition, a second courier, such as Airborne®, may receive a second code for allowing exclusive entry into the delivery receptacle for that second courier entity.

FIGURE 3 is a schematic block diagram of a security system 300 in accordance with the present invention. As shown in FIGURE 3, the security system 300 comprises a processing unit 310, a key input device 330, a remote communication unit 315, and a memory component 350. The components of the security system 300 communicate through the electrical circuitry allowing electrical data communication between the various components. In one exemplary embodiment, the components of the security system 300 may communicate through a bus 320, which is analogous to a computer architecture structure. The key input device 330 may be constructed from a keypad, for entry of numeric code combinations by a user. The key input device 330 may also include various control buttons such as a "clear" or "enter" button to control the functionality of the security system 300.

In one embodiment, the key input device may also have the circuitry that is necessary to receive a remote electrical key (not shown), wherein the functionality of the remote key may be similar to the entry of a code combination for allowing entry into the receptacle 100. In addition, the remote key may also comprise an electrical source, such as a battery, for providing an electrical source for the key input device and the security system for temporary operation if the normal power supply of the security system 300 is temporarily depleted. The processing unit 310 of the security system 300 may be constructed of known electrical components to carry out the above-described function.

In another embodiment, the security system 300 may also comprise a remote communication unit 315 for communicating the status of the security system. The remote communication unit 315 may communicate to a remote station (401 of FIGURE 4) for indicating a changed state of the security system 300. In one

exemplary embodiment, the security system 300 may communicate signals to the remote station indicating a power failure or system malfunction.

FIGURE 4 is a block diagram of a remote notification and alarm system 400 in accordance with the present invention. The system 400 comprises a remote station 401 for receiving signals from a transmitter 412 housed in the delivery receptacle 100. The remote receiver 401 includes a processor 403, a remote indicator 404 and a receiver and transmitter 405. Although this exemplary embodiment only discloses the basic components of the remote station 401, other components may be added to the system to facilitate other features of the remote notification system 400.

The remote indicator 404 housed in the remote station 401 is constructed of a visual and audio indicator, such a light and a speaker system for producing a visual and audible indicator to a user of the remote station 401. In an alternate embodiment, the remote indicator 404 may be constructed with a light indicator that displays various colors to indicate a delivery status or the indicator for may consist of an audio signal to indicate various status signals of the remote notification system 400. The remote notification indicator 404, notification processor 403 and the receiver and transmitter 405 all communicate through an electrical circuit that provides electrical communication between each component. The circuitry necessary to complete the communication between each component 401 is known to one of ordinary skill in the art.

Other embodiments of the remote indicator 404 may include the necessary circuitry to communicate to a personal computer allowing the remote station 401 to communicate to a user via electronic messages. Any form of electronic communication can be utilized in this embodiment. For example, the remote indicator 404 may communicate to a personal computer to transmit notification and alarm messages in the form of an email, pager message, or an automated phone message.

The remote notification and alarm system 400 also comprises various communication components configured to be housed in the delivery receptacle 100. The remote and alarm components housed in the delivery receptacle 100 generally include a processor 411, a transmitter and receiver 412 and an indicator mechanism 410 for detecting a change status in the receptacle 100. Similar to the remote station 401, the components housed in the delivery receptacle 100 all communicate through electrical components to provide communication between each component

necessary to carry out the described function. The circuitry used for such communication is known to one skilled in the art and will not be discussed further herein. The mechanism 410 for detecting a state change in the remote indicator and alarm system 400 may be constructed of many different embodiments. In one  
5 exemplary embodiment, the state change indicator mechanism 410 may comprise a mechanical switch for determining if the delivery receptacle has been opened.

In yet another embodiment, the indicator mechanism 410 may be constructed of a computing device that communicates through the transmitter receiver 412 to remote devices operated by a courier for determining the receipt of a delivery item.  
10 The above-described components of the remote and alarm notification system 400 operate in concert to communicate through the receivers and transmitters 405 and 412 to carry out the above-described functions of the remote notification and alarm system. More specifically, the remote notification and alarm system 400 may be  
15 configured to provide notification to a user of the remote station 401 which may be positioned in a residence so that an operator may hear or view the audible or light indicator 404 for indicating the receipt of a delivery item.

In another embodiment, the remote notification and alarm system 400 is configured to provide an operator of the system with alarm features. This feature allows the user to receive notification in the event of an unauthorized entry to the  
20 receptacle, or theft of the receptacle. In this function, the system 400 utilizes the above-described components to carry out the functions of the alarm feature. The indicator device 410 housed in the receptacle 100, in this embodiment, comprises the necessary circuitry and mechanical components for detecting movement or detecting an unauthorized entry of the receptacle 100.

25 The remote communication unit 412 shown in FIGURE 4 may also contain the necessary circuitry for an infrared or radio frequency (RF) communication with a remote hand-held device (503 of FIGURE 5A). In this embodiment, the remote notification unit 412 is configured to communicate digital key combinations and identification information with the hand-held remote device. As described in more  
30 detail below, with reference to FIGURE 5A, the hand-held remote devices may be used by a courier to communicate key combinations to access the delivery receptacle. In addition, the hand-held remote device may communicate information to identify each courier that transports delivery items to the receptacle 100.

In another embodiment, the transmitter module 412 located in the delivery  
35 receptacle is configured to be manually activated by a courier pressing a notification

button. The button can be placed directly on the transmitter module 412 or in another location inside the delivery receptacle. When the button is activated, the module sends a signal to the remote receiver 401 located in the residence of the recipient or at a place of business, and accordingly the receiver notifies the recipient of the delivery. As an alternative option, the receiver has a low-power notification lamp that can be turned off by pressing a reset button. The receiver 401 may comprise a casing having two injection molded plastic halves, an electronic circuit board, an antenna, a low voltage light, a reset button and a battery. The receiver may also feature other conveniences, such as a clock, timer, or calendar.

FIGURE 5A illustrates one exemplary embodiment of a security system 500 comprising a hand-held remote device 503. The hand-held remote device 503 comprises circuitry similar to that of the security system 300 shown in FIGURE 3. In addition, the hand-held remote device 503 comprises a display screen 505 and a keypad 506 for data display and data entry of a user of the hand-held device 503. In the embodiment of FIGURE 5A, the hand held remote device 503 comprises a remote communication unit, similar to the remote communication unit 315 described above, for communicating data to the security system 300 housed in the security receptacle 100. As described above, the hand-held remote device 503 communicates information such as a key code combination for accessing the receptacle 100 and other relevant information to identify a particular courier. In the embodiment shown in FIGURE 5A, the security system 500 communicates via a radio frequency.

FIGURE 5B illustrates a block diagram of yet another embodiment of the security system 501. As shown in FIGURE 5B, the remote hand held device 510 comprises components similar to the hand-held remote device 503. More specifically, the hand-held remote device 510 comprises the circuitry of the security system 300 of FIGURE 3, and a key input device 506 and a display 505. In the embodiment shown in FIGURE 5B, the security system 501 communicates via an infrared signal. As known to one of ordinary skill in the art, an infrared transmitter and receiver may be configured with the circuitry shown in FIGURES 3, 5A and 5B.

The hand-held remote devices utilized in the embodiment of FIGURES 5A-5B may utilize a bar code system. In the embodiment utilizing the bar code system, a bar code may be printed or affixed on the receptacle housing for scanning and the reading of identifying information. This embodiment utilizing the bar code system allows a commercial courier to open the receptacle using bar code scanning devices currently integrated in the courier's tracking system. To accommodate access by

more than one courier, a number of bar codes are located on the front face of the receptacle to allow delivery by different courier companies.

There are two main methods in which a courier can interact with the receptacle via the bar code system. The first interaction involves gaining entry into the receptacle. By the use of a bar code that is assigned to a specific courier company (also referred to as a courier entity), the courier can retrieve the combination code to the receptacle. Once the bar code is read by the bar code reader, the device will access the combination of the receptacle via a database and display the code on a digital display device on the bar code scanning unit.

The second interaction with the bar code involves the authentication of the delivery. With a unique bar code issued to each receptacle, similar to a serial number, the courier can capture the identity of the parcel, the identity of the box and the time of the scan. The above-described data communication feature also alerts the courier if a parcel is being delivered to the wrong address, thereby reducing the possibility of delivery errors. In addition, this embodiment allows information to be passed between the receptacle and the courier in a more efficient manner. This information would allow the tracking of different statistics such as a list of couriers who previously accessed the receptacle and the number of times the receptacle was accessed.

The above-described data communication and authentication feature provides proof of delivery as a substitute for a customary signature of the recipient. Given this capability, a business or courier entity may independently form a contract, such as a power of attorney, with the recipient to eliminate the need for an actual signature upon delivery. Thus, even if a signature is required on a specific delivery, this arrangement allows courier entities to legally deposit items in the receptacle without the need of a personal signature of the recipient.

In another embodiment, the security systems illustrated in FIGURES 3, 5A and 5B may be configured with circuitry to allow the operator of the hand-held remote device 503 or 510 to determine the location of the delivery receptacle 100. In this embodiment, the remote communication unit housed in the delivery receptacle 100 and the hand-held remote device comprises a transmitter and receiver configured to detect the proximity of each remote communication unit. As known to one of ordinary skill in the art, various radio communication devices and circuitry used to detect the proximity of remote stations is known in the art. The security systems 300, 500 and 501 are configured such that when in use, the operator of the

hand-held device may receive a tone with a varied volume to determine the distance relative to the delivery receptacle.

5 In another embodiment, the security system may be configured to communicate identifying information from the hand-held device to the security system housed in the delivery receptacle. This feature allows the security system in the delivery receptacle to transmit information back to the hand held device to communicate the location of the delivery receptacle. For example, the security system 300 housed in the delivery receptacle 100 may communicate that "the  
10 delivery receptacle is located behind the back entry of the residence." The location transmitter assists delivery personnel in locating the receptacle when hidden, e.g., in a garden or similar location, or when conducting deliveries at night. The location transmitter may help couriers in carrying out 24 hour per day deliveries.

Although the exemplary embodiments of the remote notification and alarm system 400 and the security system 300 are depicted in separate circuits, the features  
15 of the above-described systems may be combined into a single circuitry comprising a main processing unit and one remote communication unit. In addition, the exemplary input key device may be substituted with other data input devices for allowing data communication between a user and the security or remote system. In addition, the present invention provides other security features to allow exclusive  
20 entry into the delivery receptacle. For example, in one embodiment of the present invention, a mechanical locking device may be used in conjunction with the above-described security system to provide access to the primary opening of the delivery receptacle. This mechanical locking device may be configured to accept a mechanical key for manual entry to the delivery receptacle without the need of an  
25 electric circuit. In addition, another embodiment of the present invention provides for mechanical key devices of the interior compartments, thus allowing a courier or a U.S. Post Office carrier to access the receptacle by the use of a master key.

FIGURE 6 illustrates yet another embodiment of a delivery receptacle 600 in accordance with the present invention. The receptacle 600 illustrated in FIGURE 6  
30 is constructed in a similar manner as the delivery receptacle 100 depicted in FIGURES 1A-1C. In addition, all features of the security system and remote notification system described above can be utilized with this embodiment. However, the embodiment depicted in FIGURE 6 illustrates a receptacle 600 having a first compartment, which is denoted by reference numeral 620, affixed on the top of the  
35 housing of the delivery receptacle 600. Accordingly, a divider 605 is placed on the



top portion of the delivery receptacle 600, wherein a divider is formed by the top portion (140 of FIGURE 1A) of the delivery receptacle 600. Also shown in FIGURE 6, the receptacle 600 comprises a larger second compartment, which is denoted by reference numeral 621, where the second compartment 621 is accessible  
5 by an opening 602. The opening 602 is covered by a hinged door, which is configured in the same manner as the hinged door shown as item 107 of FIGURE 1A.

FIGURE 7 illustrates a front view of another embodiment of a delivery receptacle 700 having a single compartment. The construction of the receptacle 700  
10 is similar to that of the receptacles depicted in FIGURE 1A and 6, however, the embodiment of FIGURE 7 includes only one internal compartment, which is denoted by reference numeral 721. Similar to the embodiment of FIGURE 6, this embodiment of FIGURE 7 may also utilize all of the security and notification features described above. In addition, the internal compartment 721 may be accessed  
15 via a single opening 702. In this embodiment, the opening 702 may be constructed from any of the previously disclosed methods. For example, the opening 702 may be a permanently open slot sized to receive letters or small parcels, a hinged door (similar to 107 of FIGURE 1A), or an electronically controlled door, which may be controlled by the security system disclosed and described above. The embodiment of  
20 FIGURE 7 also includes a primary opening similar to that disclosed in the embodiment of FIGURES 1A-1C.

Referring now to FIGURE 8, another embodiment of a delivery receptacle 800 having multiple openings and multiple compartments is disclosed and described herein. As shown in FIGURE 8, the delivery receptacle 800 comprises  
25 five separate compartments, where each compartment comprises an enclosed compartment and an opening to the front of the receptacle 800. As shown in FIGURE 8, the receptacle 800 comprises a first opening 805, which is similarly constructed to the mail slot in the receptacle 100 of FIGURE 1A. In addition, the embodiment of FIGURE 8 discloses four separate secured compartments 806, 807,  
30 808 and 809, each having individual keypad devices. Similar to the previously disclosed embodiments, the embodiment of FIGURE 8 includes four internal dividers (not shown) to separate each internal compartment. Although this exemplary embodiment of FIGURE 8 discloses four secure compartments having equal size, variations can be made such that specific compartments are sized to accommodate  
35 different requirements. For example, it may be appropriate to size the bottom

compartments 808 and 809 to accommodate a larger capacity than the top secure compartments 806 and 807.

Referring now to FIGURE 9, an exemplary embodiment of a receptacle 900 having a stand or support post. As illustrated in FIGURE 9, all of the previously disclosed embodiments of FIGURES 1A-1C, FIGURE 6, FIGURE 7 and FIGURE 8 may be used with a brace or post to mount the receptacle 900 at an elevated level above the ground. The exemplary post 901 depicted in FIGURE 9 may be constructed of any rigid material such as steel or concrete, wood or any other material sufficient to securely mount the delivery receptacle 900. In another embodiment, the delivery receptacle designed for a post mounting, as shown in FIGURE 9, may be sized similar to that of a traditional mailbox. In this embodiment of FIGURE 9, the delivery receptacle 900 also includes all of the above features of the previously disclosed embodiments. In addition, the embodiment of FIGURE 9 may include any combination of the previously disclosed features. For example, a post-mounted receptacle may include multiple compartments, a security device, notification system, and a remote controlled device.

In accordance with another aspect of the present invention, various methods are provided by the present invention to facilitate and manage the use of the above-described receptacles. The method and systems used in conjunction with the secure delivery receptacle involve computer-controlled processes in combination with commerce transactions. As contemplated by the present invention, there are two types of methods: the sales process and the return sale process. The methods described herein, and shown in the flow diagrams of FIGURES 12-13, involve the distribution of the secure delivery receptacles and the operations of monitoring and managing delivery activities utilizing the delivery receptacles.

FIGURE 10 depicts several of the key components of an exemplary client 1000 that may be used in accordance with the methods of the present invention. Those of ordinary skill in the art will appreciate that the client 1000 may include many more components than those shown in FIGURE 10. However, it is not necessary that all of these generally conventional components be shown in order to disclose an illustrative embodiment for practicing the present invention. As shown in FIGURE 10, the client 1000 includes a network interface 1030 for connecting to the Internet. Those of ordinary skill in the art will appreciate that the network interface 1030 includes the necessary circuitry for such a connection, and is also constructed for use with the TCP/IP protocol.

The client 1000 also includes a processing unit 1010, a display 1040, and a memory 1050 all interconnected along with the network interface 1030 via a bus 1020. The memory 1050 generally comprises a random access memory ("RAM"), a read-only memory ("ROM") and a permanent mass storage device, such as a disk drive. The memory 1050 stores the program code necessary for entering and requesting order information over the Internet. More specifically, the memory 1050 stores a Web browser application 1011, such as NETSCAPE NAVIGATOR, MICROSOFT Internet Explorer or the phone.com UP.link microbrowser, used in accordance with the present invention for depicting order and commerce information over the Internet. In addition, memory 1050 also stores an operating system 1055. It will be appreciated that these software components may be loaded from a computer-readable medium into memory 1050 of the client 1000 using a drive mechanism associated with the computer-readable medium, such as a floppy, tape or DVD/CD-ROM drive (not shown) or via the network interface 1030.

Although an exemplary client 1000 has been described that generally conforms to a conventional general purpose computing device, those of ordinary skill in the art will appreciate that a client 1000 may be any of a great number of devices capable of communicating with the Internet or with a Web server. For example, an exemplary list of possible clients might include two-way pagers, cellular phones, personal data assistants, or the like.

FIGURE 11 depicts several of the key components of the Web server 1100. Those of ordinary skill in the art will appreciate that the Web server 1100 includes many more components than those shown in FIGURE 11. However, it is not necessary that all of these generally conventional components be shown in order to disclose an illustrative embodiment for practicing the present invention. As shown in FIGURE 11, the Web server 1100 is connected to the Internet via a network interface 1130. Those of ordinary skill in the art will appreciate that the network interface 1130 includes the necessary circuitry for connecting the Web server 1100 to the Internet, and is constructed for use with the TCP/IP protocol.

The Web server 1100 also includes a processing unit 1110, a display 1140, and a mass memory 1150 all interconnected along with the network interface 1130 via a bus 1120. The mass memory 1150 generally comprises RAM, ROM, and one or more permanent mass storage devices, such as a hard disk drive, tape drive, optical drive, floppy disk drive, or combination thereof. The mass memory 1150 stores the program code and data necessary for receiving, processing, formatting and sending

messages, as well as, supplying the results of that processing to senders in accordance with the present invention. More specifically, the mass memory 1150 stores Web server software 1160 for handling requests for stored information received via the Internet and the Web, and an operating system 1155. It will be appreciated that the aforementioned software components may be loaded from a computer-readable medium into mass memory 1150 of the Web server 1100 using a drive mechanism associated with the computer-readable medium, such as floppy, tape or DVD/CD-ROM drive (not shown) or via the network interface 1130. The client 1000 and Web server 1100 may communicate via a large area network, such as the Internet or other like network.

Referring now to FIGURE 12, one embodiment of a sales transaction process and delivery method 1200 will be described. The sales transaction process 1200 starts at a step 1201 where a client computer associated with a business entity receives order information on a delivery item and order information related to a delivery receptacle. In this part of the process, a consumer entity, otherwise referred to as a customer of a retailer, orders commerce items from a commerce Web page. For purposes of this disclosure, a business entity may be an entity that is associated with the management of the sales transaction process 1200 and/or an entity that is associated with providing a delivery receptacle.

Upon the completion of consumer order, the retailer, also referred to as a commerce entity, would transmit order information to the business entity. The information that is transferred in this step may include the information regarding the consumer's order, e.g., quantity and descriptive product information related to the item to be delivered. In addition, the information transferred from the retailer to the commerce entity would include information related to a delivery receptacle that is ordered with the commerce items. In this part of the process, the serial number and other identifying information related to the consumer entity's purchased receptacle would be relayed to the business entity.

Next, at a step 1203, if the consumer ordered a delivery receptacle, the process proceeds where either the commerce or business entity provides a delivery receptacle to the consumer entity. In one embodiment of this procedure, the delivery receptacle can be provided by the commerce entity along with the commerce item, also referred to as the delivery item. This procedure allows for a delivery such that the delivery items can be placed inside the delivery receptacle for simultaneous delivery.

Next, as shown in a determination block 1204, the process proceeds where a determination is made to see if a receptacle is received. In this part of the process, the business entity may receive a signal to indicate that the consumer entity received the delivery receptacle. Here, the courier delivering the receptacle and delivery item may transmit a signal, via an electronic communication means, to the business entity indicating that the consumer entity has received the delivery receptacle.

As indicated in step 1207, once the delivery receptacle is received, the commerce entity activates an account and establishes a database which stores information related to the consumer entity and the received delivery receptacle. In this part of the process, the commerce entity may store the consumer's personal information such as name, telephone number, address, and purchase information. Once the account and the database are established by the commerce entity, the process proceeds to block 1209 where the commerce entity tracks the order data of the consumer to monitor the delivery of future commerce items to be received by the delivery receptacle. This tracking procedure would involve known package tracking software applications known to one skilled in the art, and would further include a step where the business entity would monitor and collect compensation, monetary or trade based compensation, for the use of the delivery receptacle used in each commerce transaction.

In one other embodiment, a method for tracking delivery activity comprises, providing a delivery receptacle with a notification system having a mechanism for monitoring the number of times a courier delivers a delivery item to the delivery receptacle, thereby creating a record of deliveries. Determining a royalty or compensation value based on the record of deliveries, and receiving a royalty or compensation value from a courier entity or commerce entity. This embodiment is analogous to a pay-per-use model, where a business entity would charge a fee that is based on the use of the delivery receptacle. The notification system in this embodiment utilizes the electronic components as those illustrated in FIGURES 3 and 4, and the computing systems of FIGURES 10 and 11 to monitor the number of times a courier or a particular retailer utilizes a delivery receptacle.

Referring now to FIGURE 13, an exemplary embodiment of the method for returning a commerce item is shown and disclosed herein. The Return Sale Process 1300 begins at box 1301 where the customer contacts a commerce entity to arrange a product return. At this stage, the commerce entity then authorizes the return and generates an authorization code. Similar to the Sales Process 1200 of FIGURE 12,

the customer is then linked to a web server of a business entity. One such web page of a business entity can be found at WWW.GUARANTEEDEDELIVERIES.COM. The business entity then confirms the ID of the commerce entity. Alternatively, the customer may contact the business entity or any courier entity to arrange a package pick up from their secure delivery receptacle located at their home or office location.

Next, the process continues where the consumer entity contacts the business entity to coordinate a pickup. When the customer provides the parcel information with the business entity, the server associated with the business entity then calculates the weight and size of the return parcel. At this stage, as shown in block 1303, the business entity also generates a return label and an e-mail stamp label for the return parcel. The e-mail stamps are in the form of US Post Office bar-code stamps, similar to the product currently provided by stamps.com™. The business entity may also maintain a database of various products sold by different on-line commerce entities, also referred to as e-tailers. The system is equipped such that a user would only have to provide a product bar-code or a book ISBN in their shipping registration with the business entity. The system associated with the business entity then performs a database inquiry to the product bar-code or ISBN and then return a value for the product weight, thus producing the proper postage.

Next, the business entity then provides services to manage the customer's shipping bill. More specifically, the web server associated with the business entity provides services to bill the customers' credit card or bill the commerce entity.

After the customer registers the package, the business entity then notifies the courier of the pickup. The customer is only required to deposit the package into the secure delivery receptacle at their location. At this time, the shipping task is then managed by the courier; the customer does not have to coordinate a pickup with the carrier or deliver the package to a courier station.

At least at one time during the delivery process, the business entity sends an electronic message to the commerce entity to give notice of the package tracking status. This step provides information to the commerce entity for increased security and a better means for inventory tracking. Next, the business entity receives commission or collects a fee from the commerce entity or the customer for the use of the receptacle. In addition, this part of the process may also provide the business entity with a royalty from the courier. Also similar to the sales process 1200, the return sale process 1300 also stores the customer transactional information in a database to monitor the use of the receptacle.

By the execution of the above-described process, the return of merchandise is facilitated and managed, where the customer may carry out a return with one contact to the retailer or business entity for a return authorization number. The business or commerce entity would then manage the return as described above, thereby providing the proper postage. The customer is then only required to place the return parcel in the secure delivery receptacle and either the business entity or consumer contacts the courier company to coordinate pickup. The business entity then tracks the parcel and notifies the commerce entity and the customer of the shipping status.

In an alternate embodiment of the return process 1300, an individual may utilize the receptacle to send a package that is not associated with a returned item. For example, the above-described method may be used by any owner of a delivery receptacle to send a package to any destination by providing notice to a courier of the delivery and placing the package in the receptacle to facilitate a secured pickup from the courier.

While the preferred embodiment of the invention has been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention. For example, although the exemplary embodiments of the receptacle illustrate a housing that is mounted onto a base, it is appropriate to construct the receptacle such that the housing and base are made from one component. In addition, as known to one of ordinary skill in the art, the receptacle may be in any shape, e.g., rounded, oval, or in an oblong shape, such that the receptacle can still carry out the above-described functions. For instance, one embodiment of the receptacle may include a solid or hollowed base portion having an elongated shape to form a stand. In this embodiment, the large compartment may be formed with a divider above the elongated base component.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A delivery receptacle for receiving delivery items from a plurality of delivery couriers, said delivery receptacle comprising:
  - a first compartment, wherein said first compartment comprises an enclosure and a first opening configured for receiving said delivery items;
  - a second compartment, wherein said second compartment comprises a secured enclosure and a second opening for receiving said delivery items, said second compartment is accessible by a security system to limit access of said second compartment.
2. The A delivery receptacle of Claim 1, further comprising, a primary opening configured to provide access to said first and second compartment, sized to allow passage of said delivery items in and out of first and second compartment.
3. A delivery receptacle for receiving delivery items from a plurality of delivery couriers, wherein said plurality of delivery couriers comprises at least a first delivery courier and a second delivery courier, said delivery receptacle comprising:
  - a first compartment for receiving said delivery items exclusively from said first delivery courier, wherein said first compartment comprises an enclosure and an opening accessible by said first delivery courier;
  - a second compartment for receiving said delivery items from said second delivery courier, wherein said second compartment comprises a secured enclosure and an opening accessible by said second delivery courier, said second compartment is accessible to said plurality of delivery couriers by the use of a security system to limit access of said second compartment; and
  - a primary opening configured to provide a delivery recipient access to said first and second compartment.
4. The delivery receptacle of Claim 3, further comprising a third compartment for receiving said delivery items from said plurality of delivery couriers, wherein said third compartment comprises an enclosure and an opening accessible to said plurality of delivery couriers, and wherein said third compartment is accessible by said primary opening for providing access to said delivery recipient.



5. The delivery receptacle of Claim 4, further comprising a fourth compartment for receiving said delivery items from said plurality of delivery couriers, wherein said fourth compartment comprises an enclosure and an opening accessible to said plurality of delivery couriers, and wherein said fourth compartment is accessible by said primary opening for providing access to said delivery recipient.

6. The delivery receptacle of Claim 3, wherein said security system is configured to provide security access of said primary opening and plurality of said compartments, said security system configured to allow select delivery couriers of said plurality of delivery couriers to access specific compartments of said delivery receptacle, said security system.

7. The delivery receptacle of Claim 3, wherein said security system comprises:

a processing component for storing and processing code combinations, wherein code combinations are configured to allow select delivery couriers to access predetermined compartments of said delivery receptacle, and wherein code combinations are configured to allow said delivery recipient access to all compartments of said delivery receptacle; and

at least one key input device for receiving code combinations from said plurality of delivery couriers and said delivery recipient, said key input device configured to electronically communicate with said processing component for transmission of said code combinations.

8. The delivery receptacle of Claim 7, wherein said security system further comprises an electronic communication system for communicating identification information and code combination information between said processing component and a remote receiver device controlled by at least one delivery courier of said plurality of delivery couriers.

9. The delivery receptacle of Claim 3, further comprising a remote notification system for communicating delivery information to a remote station, wherein said delivery information is effective for indicating the receipt of said delivery item.

10. The delivery receptacle of Claim 9, wherein said delivery information further communicates a time and date of a delivery of said delivery items.

11. The delivery receptacle of Claim 9, wherein said delivery information further communicates a name of at least one of said plurality of delivery couriers associated with said received delivery item.

12. The delivery receptacle of Claim 9, wherein said remote notification system comprises a transmitter housed in said delivery receptacle, wherein said transmitter is configured to communicate to said remote station via a wireless communication transmission, said transmitter configured to communicate with a mechanism for determining the receipt of said delivery item.

13. The delivery receptacle of Claim 3, wherein said first delivery courier is associated with a government postal service and said second delivery courier is associated with an express delivery entity.

14. The delivery receptacle of Claim 3, further comprising a housing constructed of a back wall, two lower side walls, two upper side walls, a front wall, a top portion and a base, wherein said back wall is formed with said two lower side walls and at least one divider to form said first and second compartments, wherein said back wall and said two lower side walls are affixed to the top of said base, said top portion is formed with said two upper side walls to create secured enclosure for said first and second compartments, and wherein said top portion is pivotally secured to said back wall.

15. The delivery receptacle of Claim 14, further comprising a third compartment, said third compartment formed by said back wall, said two lower side walls and at least one divider.

16. The delivery receptacle of Claim 15, further comprising a fourth compartment, said fourth compartment formed by said back wall, said two lower side walls and at least one divider.

17. The delivery receptacle of Claim 3, further comprising:  
a housing, wherein said housing forms said first and second compartment;  
and

a base, wherein said housing is affixed to the top of said base, and wherein said base is configured to receive a filling material for adding weight to said base.

18. The delivery receptacle of Claim 3, further comprising a housing to form said first compartment and second compartment, wherein the housing comprises an insulation material.

19. The delivery receptacle of Claim 3, further comprising an internal locking mechanism, the locking mechanism including an internal bag that is configured to be affixed to the enclosure of the second compartment.

20. A method for tracking and managing the delivery of at least one delivery item, wherein said delivery item is ordered by a consumer entity and ordered from a commerce entity, said method comprising:

receiving order information from a computing device associated to said commerce entity, wherein said ordering information describes a shipping information of said delivery item and information related to a purchase of a delivery receptacle;

providing said delivery receptacle to said consumer entity;

determining if said delivery receptacle is received by said consumer entity;

and

activating an account of said consumer entity, if said delivery receptacle is received by said consumer entity, wherein said account is associated to a database and computing device for tracking the delivery of delivery items to said consumer entity.

21. The method of Claim 20, further comprising, tracking order information of said commerce entity for providing notification to said consumer entity with a status indicator.

22. The method of Claim 21, wherein the status indicator is provided by a computing device in the form of an electronic messaging system.

23. The method of Claim 21, wherein a third-party provider of said delivery receptacle receives a monetary compensation for said tracking procedure.

24. The method of Claim 20, wherein said delivery receptacle is provided by said commerce entity.

25. The method of Claim 20, wherein said delivery receptacle is provided by a third-party provider of said delivery receptacle.

26. The method of Claim 20, wherein said commerce entity receives said order information by a method comprising:

providing a Web page that includes a browsable catalog of items and provides services for allowing customers to electronically purchase the items;  
displaying information identifying the item; and  
receiving said order information.

27. The method of Claim 20, further comprising, wherein a third-party provider of said delivery receptacle receives a monetary compensation associated to a product transaction described by said order information.

28. The method of Claim 27, wherein the monetary compensation is calculated on a pay-per-use model.

29. The method of Claim 20, wherein said delivery receptacle, comprises:  
a first compartment for receiving said delivery items exclusively from a first delivery courier, wherein said first compartment comprises an enclosure and an opening accessible by said first delivery courier;

a second compartment for receiving said delivery items from a second delivery courier, wherein said second compartment comprises a secured enclosure and an opening accessible by said second delivery courier, said second compartment is accessible to a plurality of delivery couriers by the use of a security system to limit access of said second compartment to select couriers of said plurality of delivery couriers; and

a primary opening configured to provide a delivery recipient access to said first and second compartment.

30. The method of Claim 20, further comprising, receiving compensation for services associated with said delivery utilizing said delivery receptacle.

31. A method for tracking delivery activity, wherein the method comprises:

providing a delivery receptacle with a notification system having a mechanism for monitoring the number of times a courier entity delivers a delivery item to a delivery receptacle, thereby creating a record of deliveries;

determining a value based on the record of deliveries; and

receiving a compensation based on the determined value, wherein the compensation originates from an entity.

32. The method of Claim 31, wherein the entity is a courier entity.

33. The method of Claim 31, wherein the entity is a commerce entity.

34. A method for tracking and managing a return of a delivery item, wherein the return of the delivery item is ordered by a consumer entity and the delivery item is to be returned to a commerce entity, said method comprising:

receiving order information from a computing device, wherein said order information is indicative of the return requested by the consumer entity, wherein said delivery item is to be transferred to said commerce entity; and

transmitting data to commerce entity to indicate a return, wherein data comprises information regarding said delivery item to be returned.

35. The method of Claim 34, further comprising:

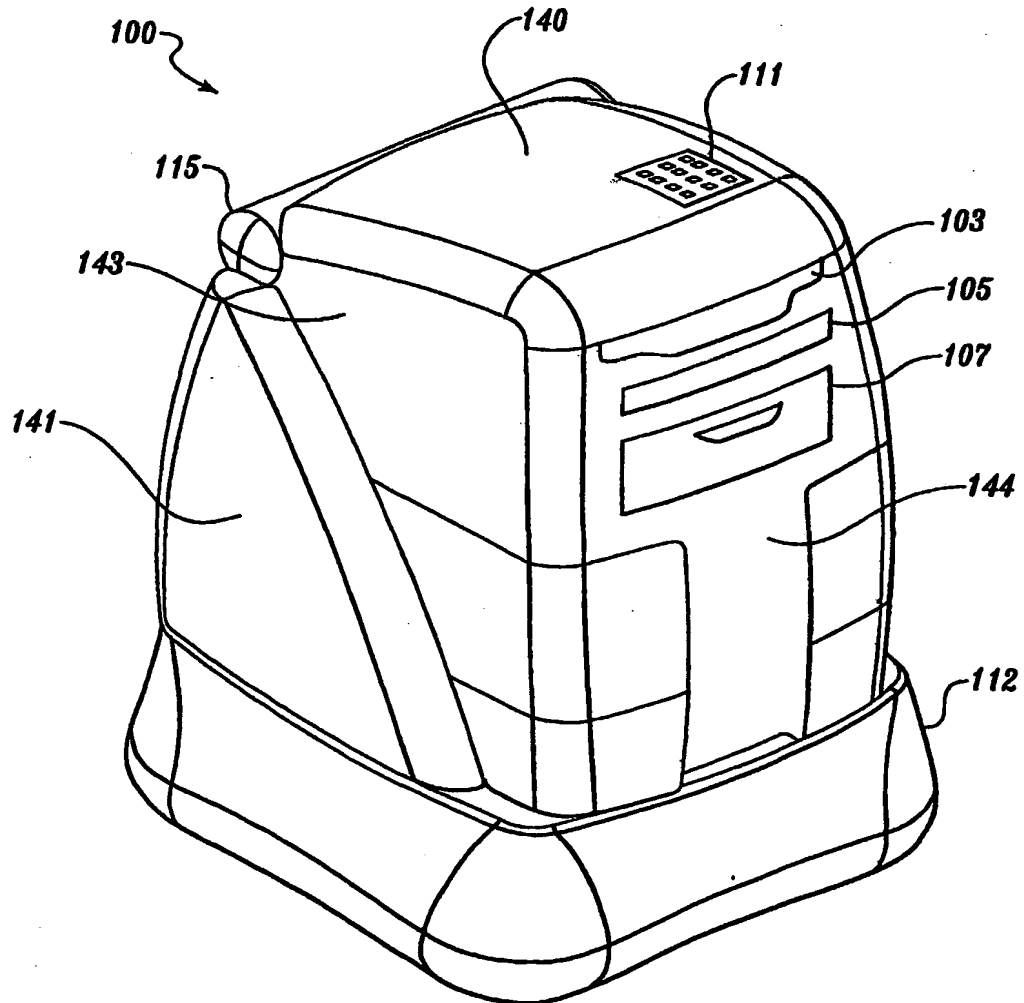
verifying the completion of the transfer of the delivery item to the commerce entity; and

transmitting data to the customer entity to indicate the completion of the transfer of the delivery item.

36. The method of Claim 34, further comprising, receiving compensation for services associated with a delivery receptacle and return services.

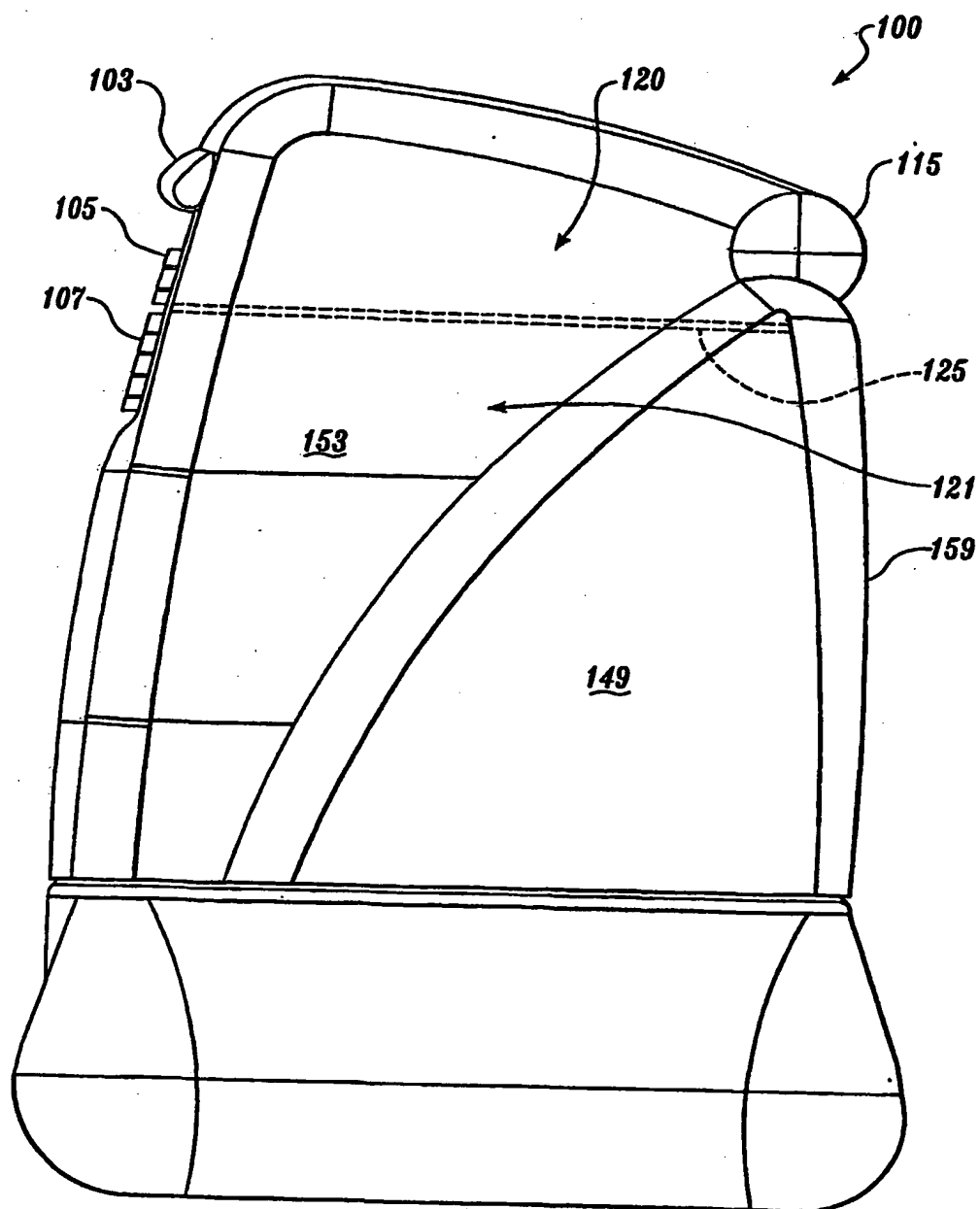
37. The method of Claim 34, further comprising, sending compensation for postage to consumer entity.

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*Fig. 1A*

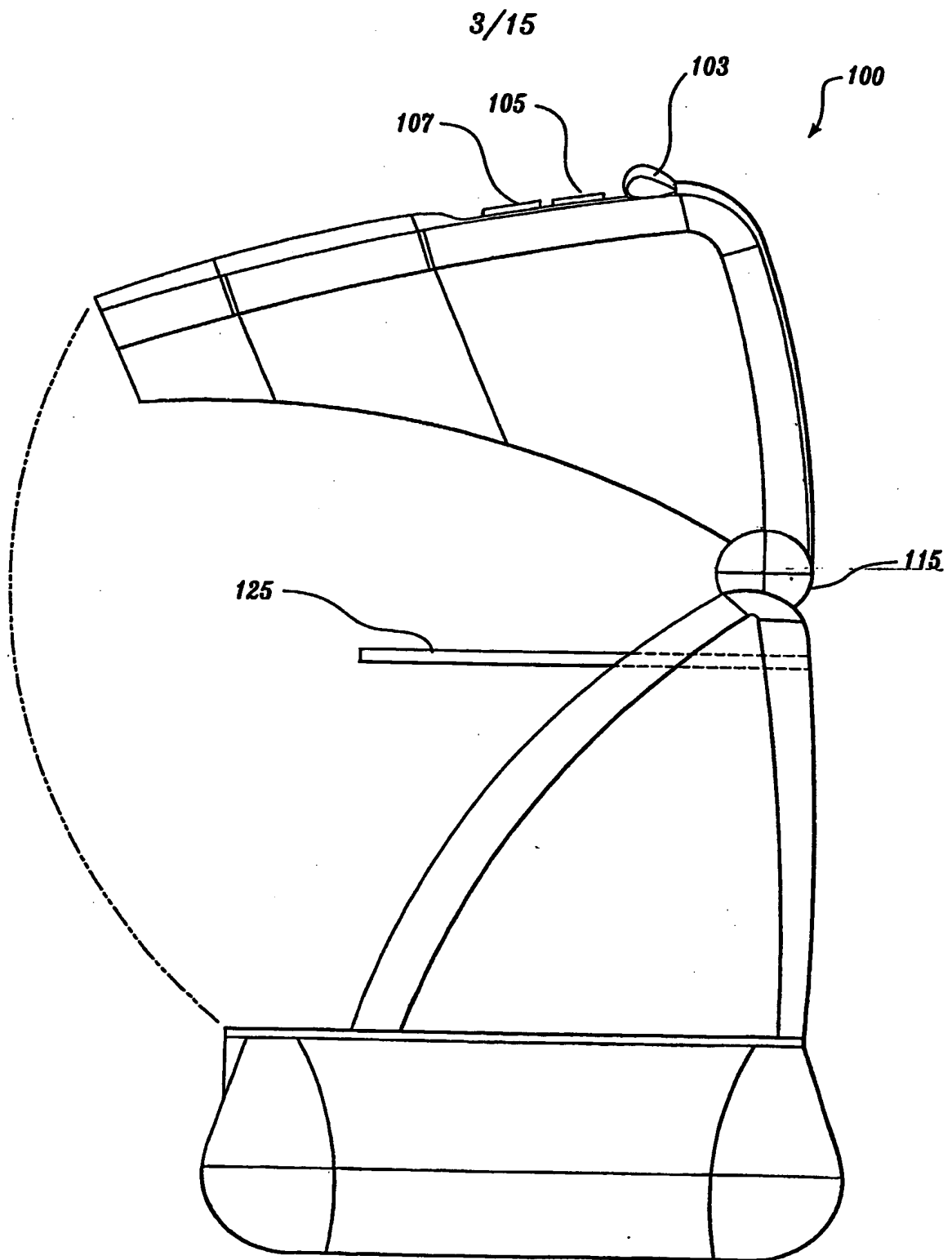
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*Fig. 1B*

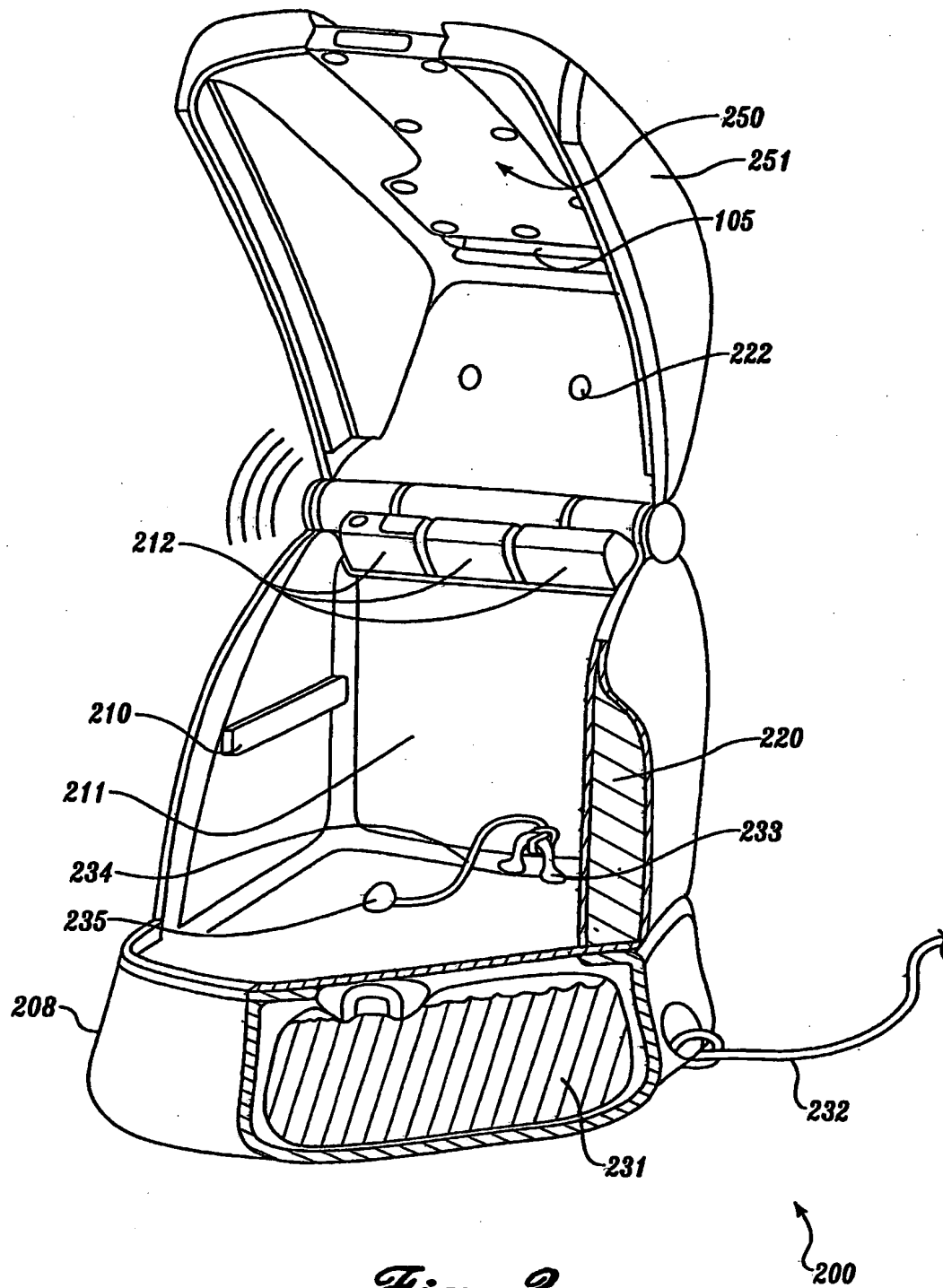
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*Fig. 1C*

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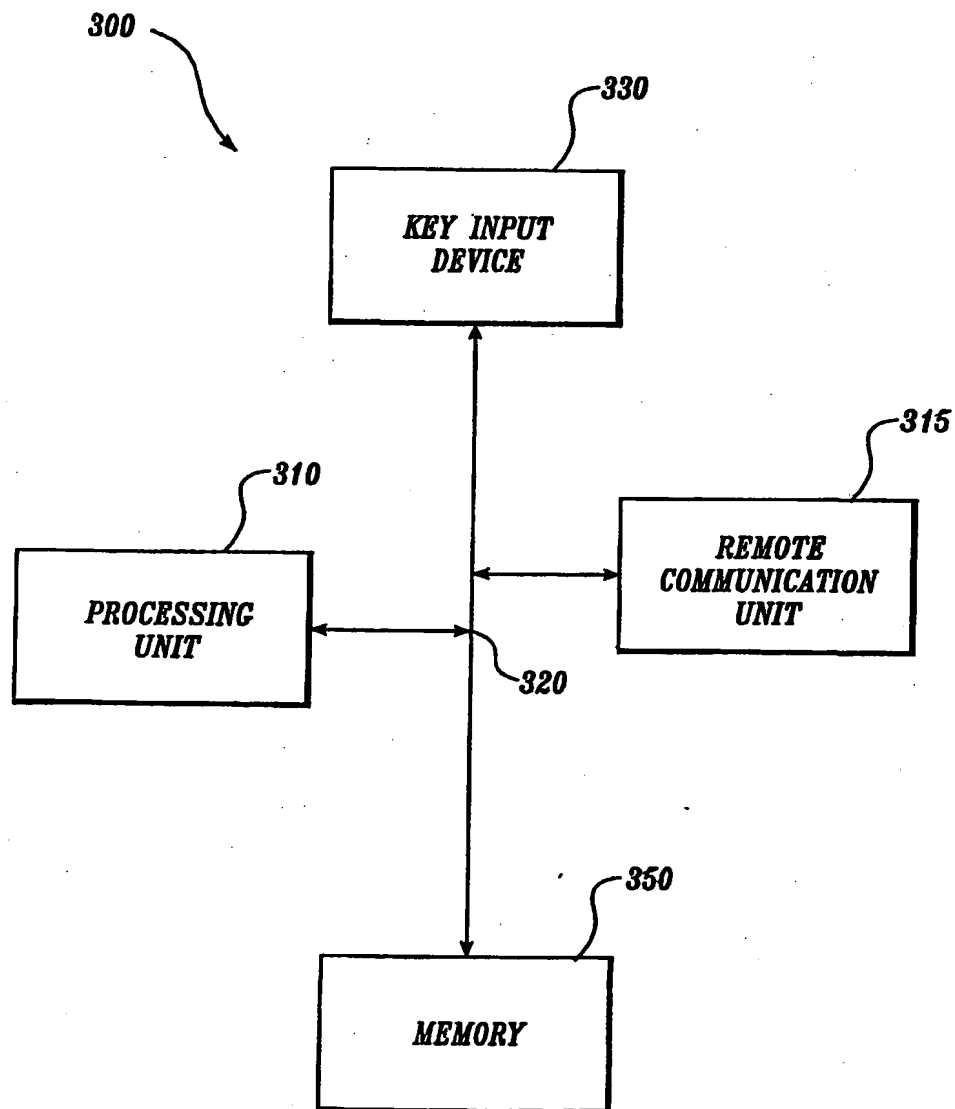


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*Fig. 2*

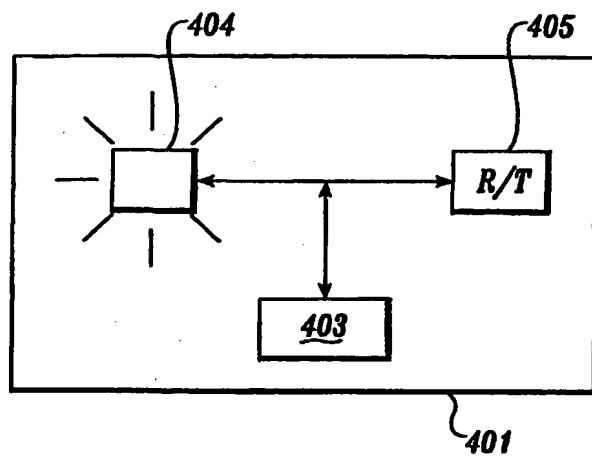
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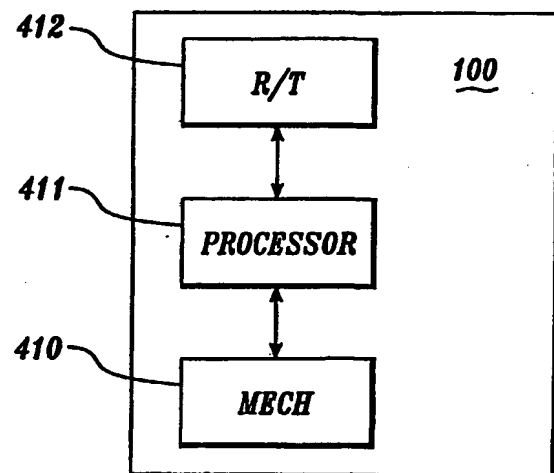
*Fig. 3*

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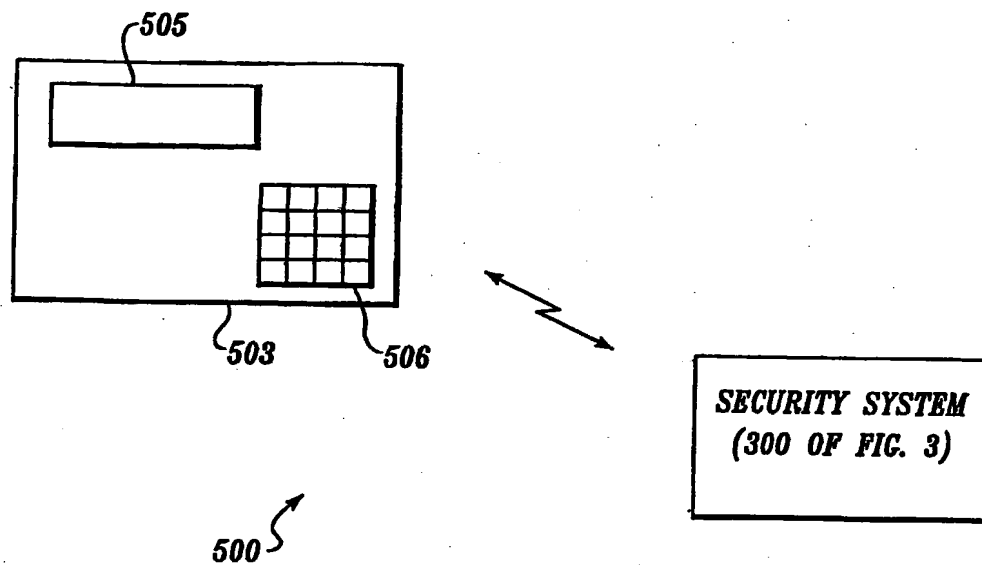


400

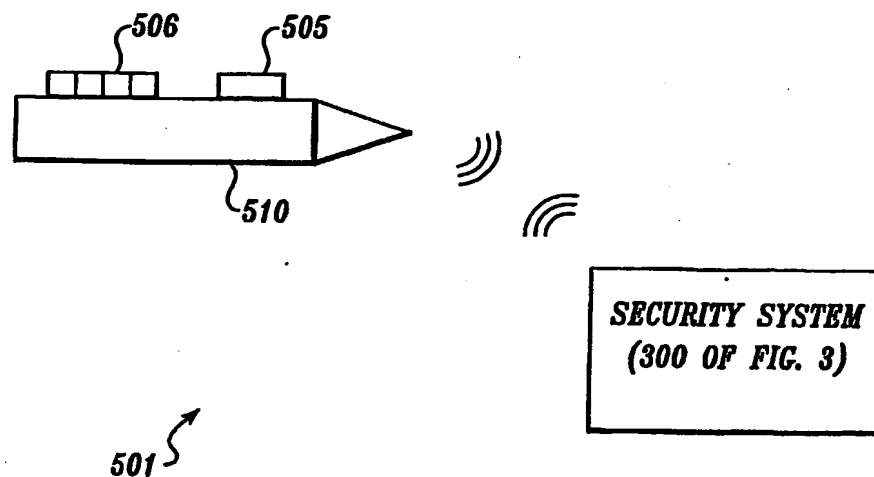
*Fig. 4*

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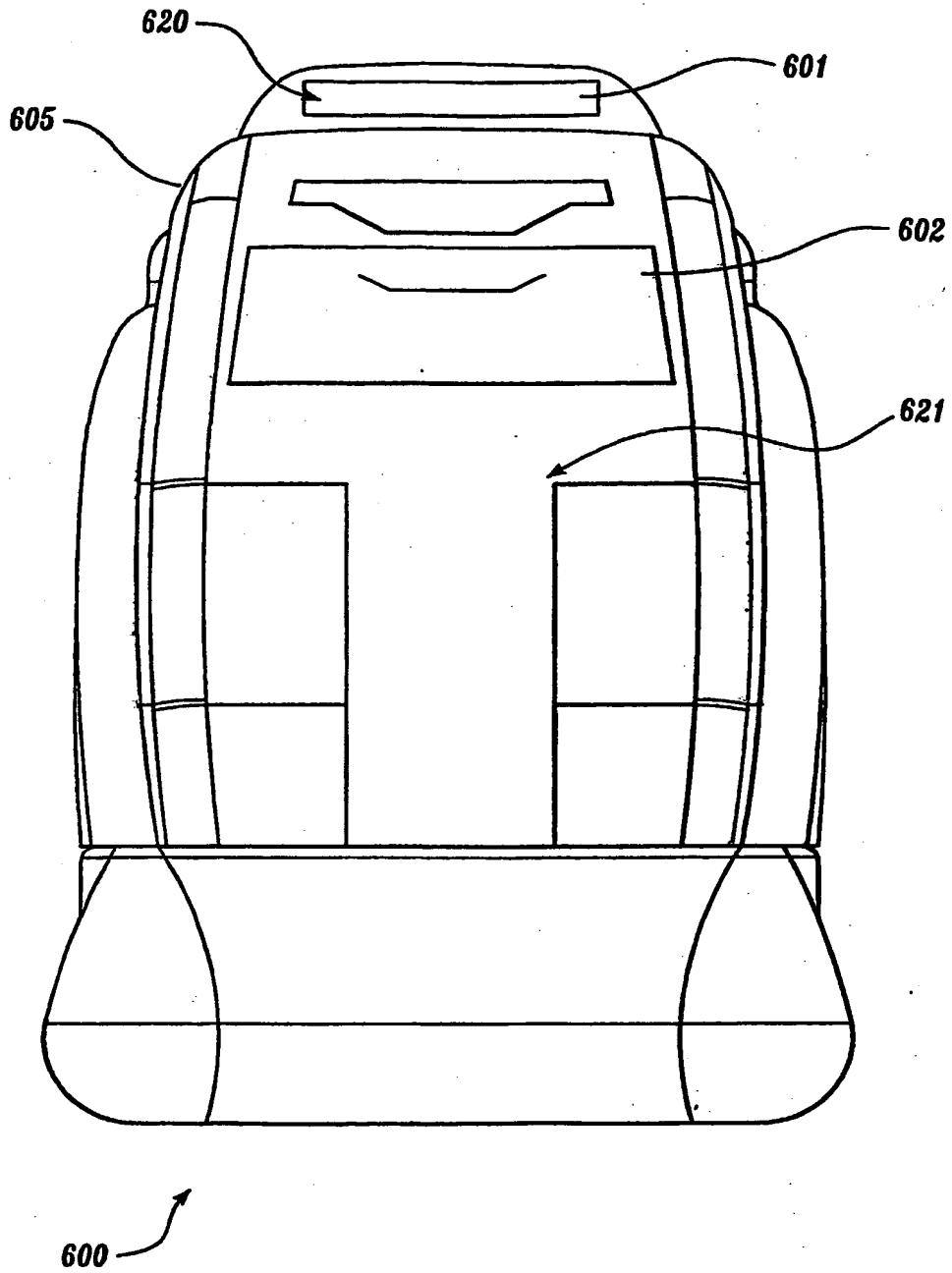
*Fig. 5A*



*Fig. 5B*

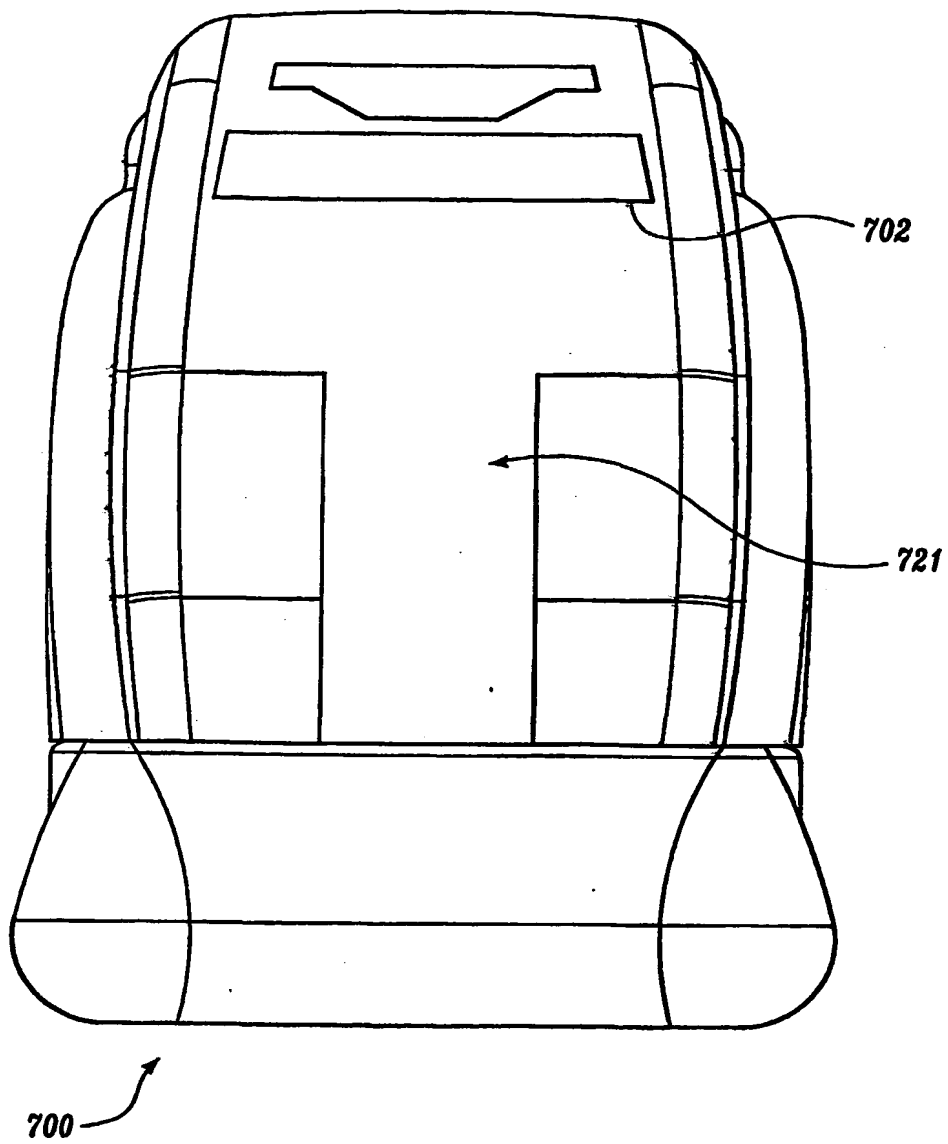
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*Fig. 6*

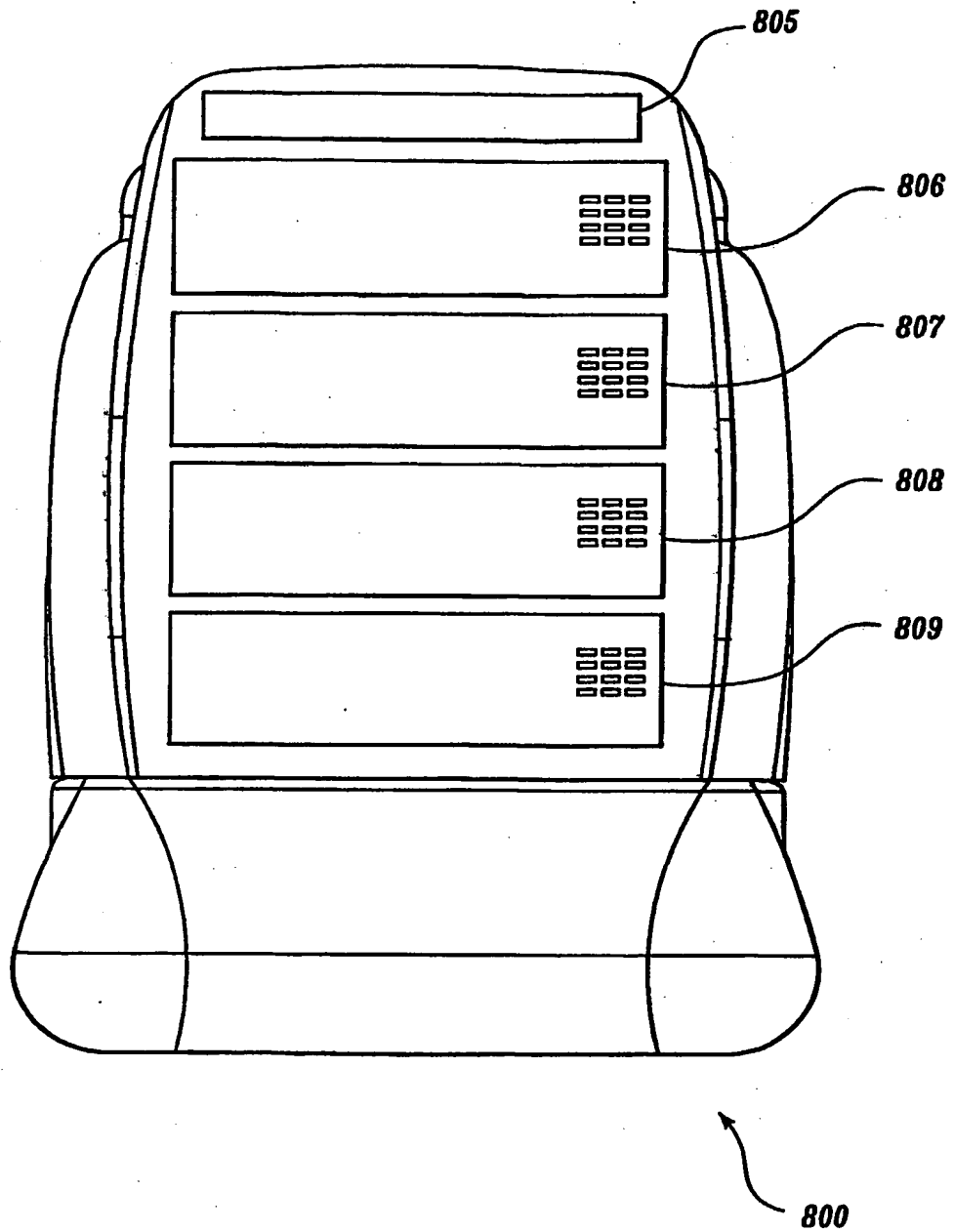
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*Fig. 7*

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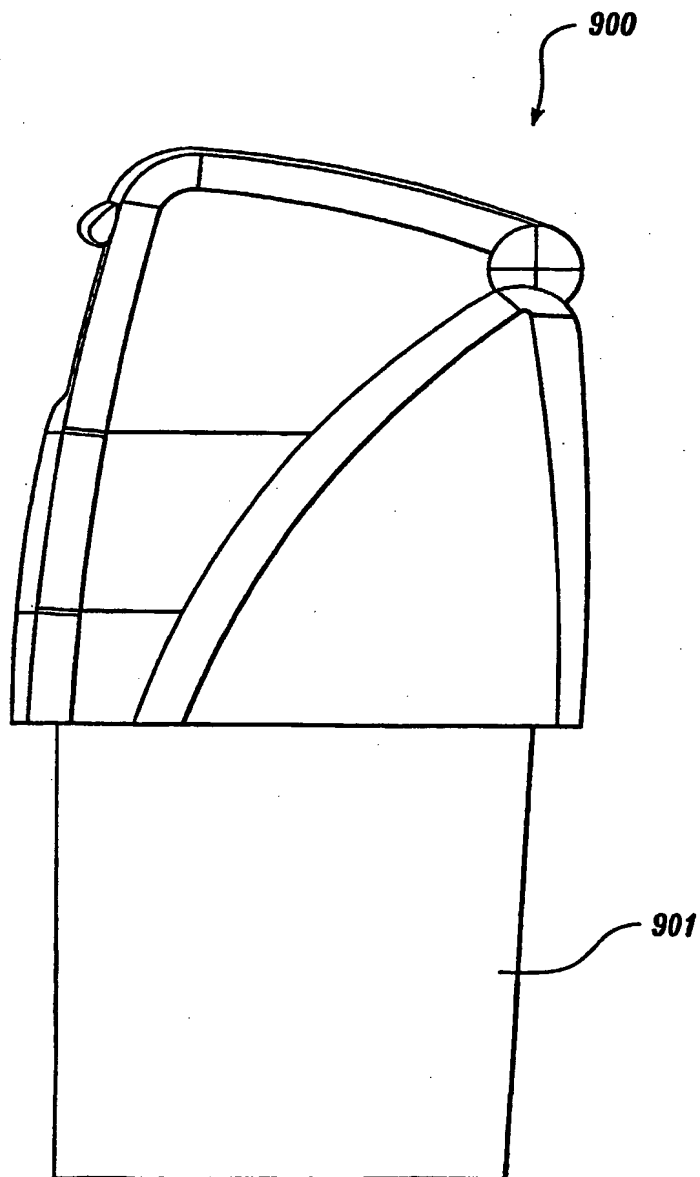
10/15



*Fig. 8*

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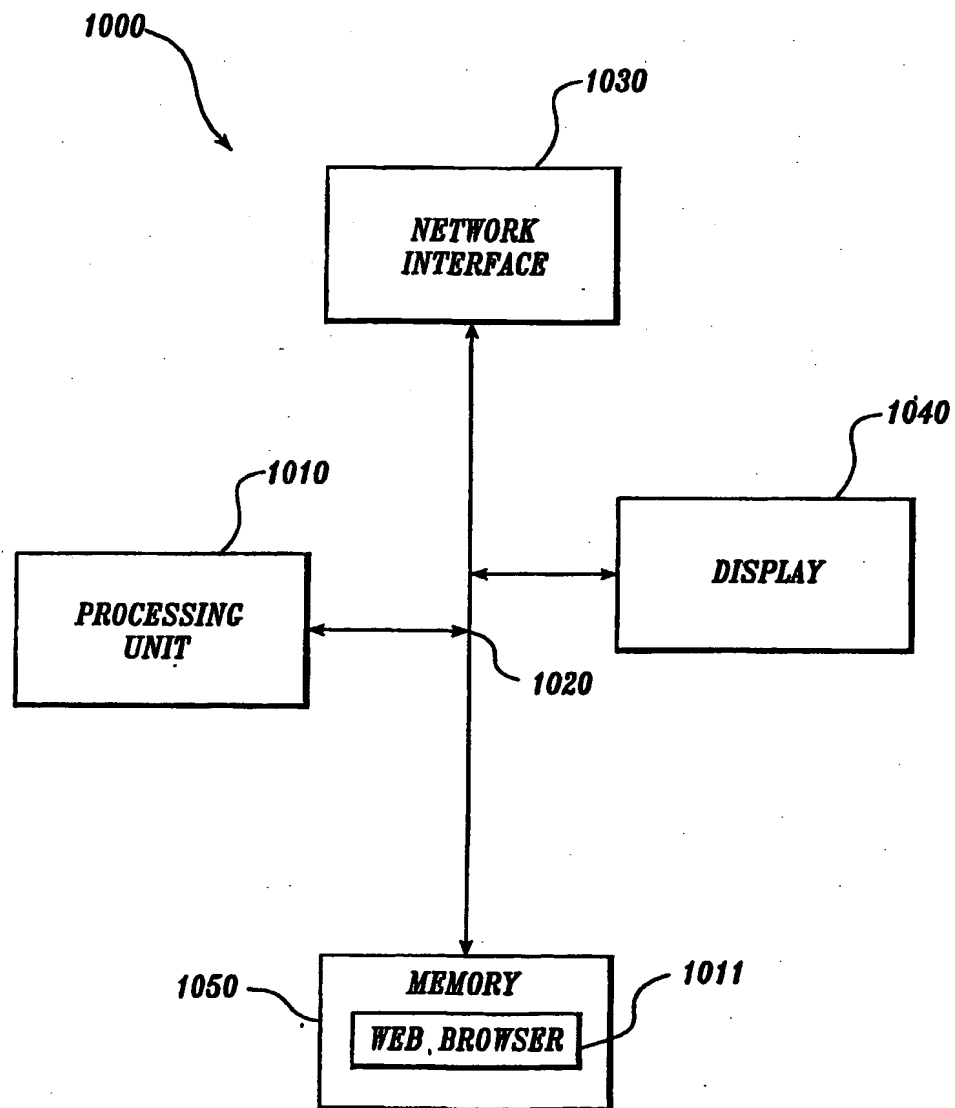
11/15

*Fig. 9*

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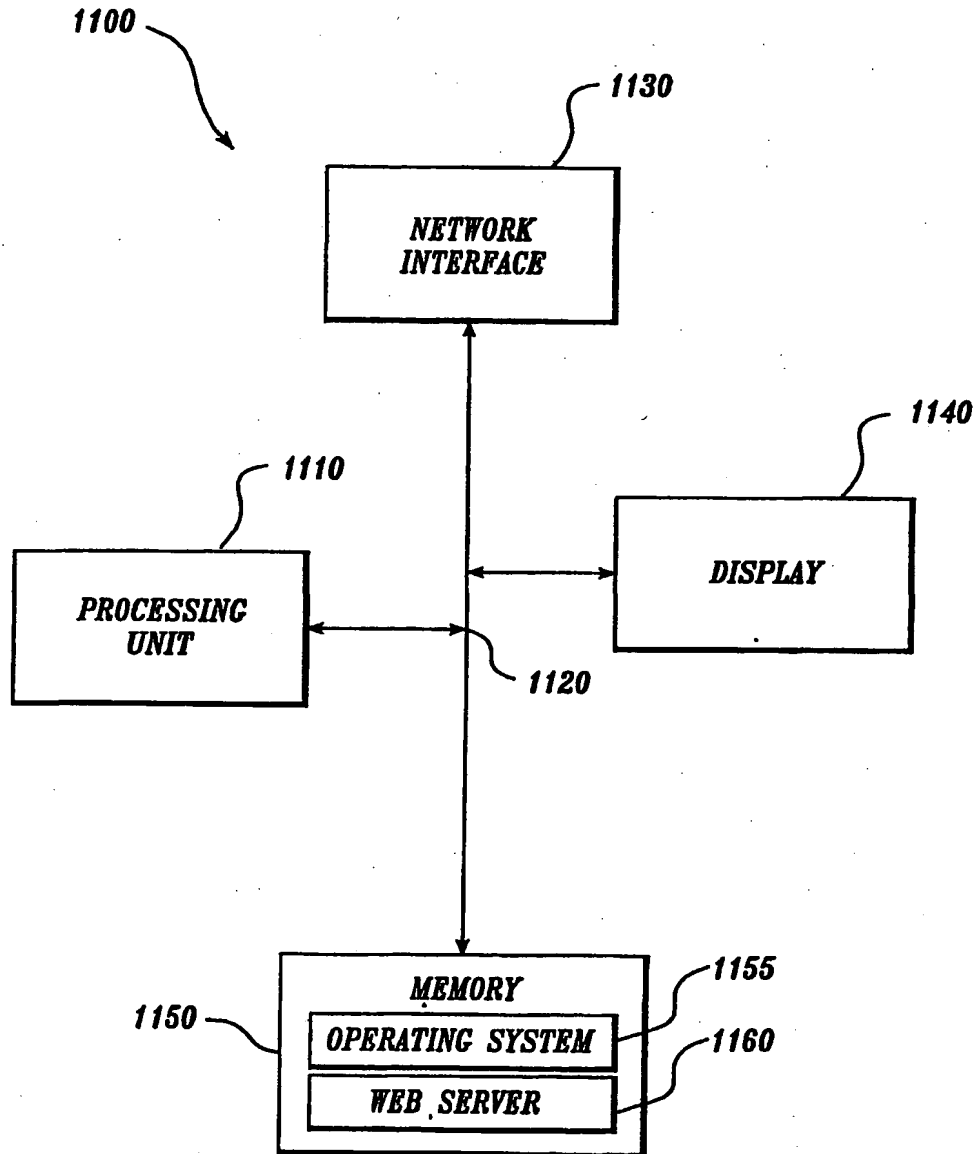


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*Fig. 10*

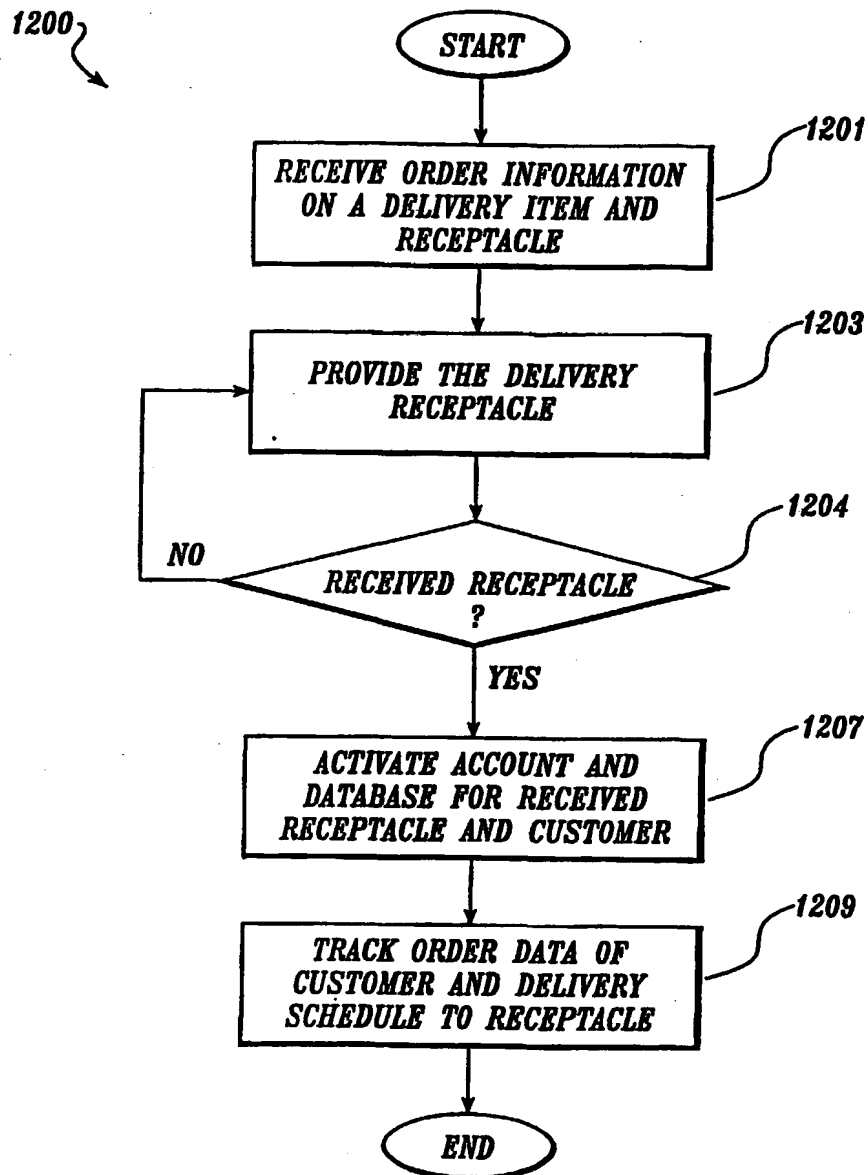
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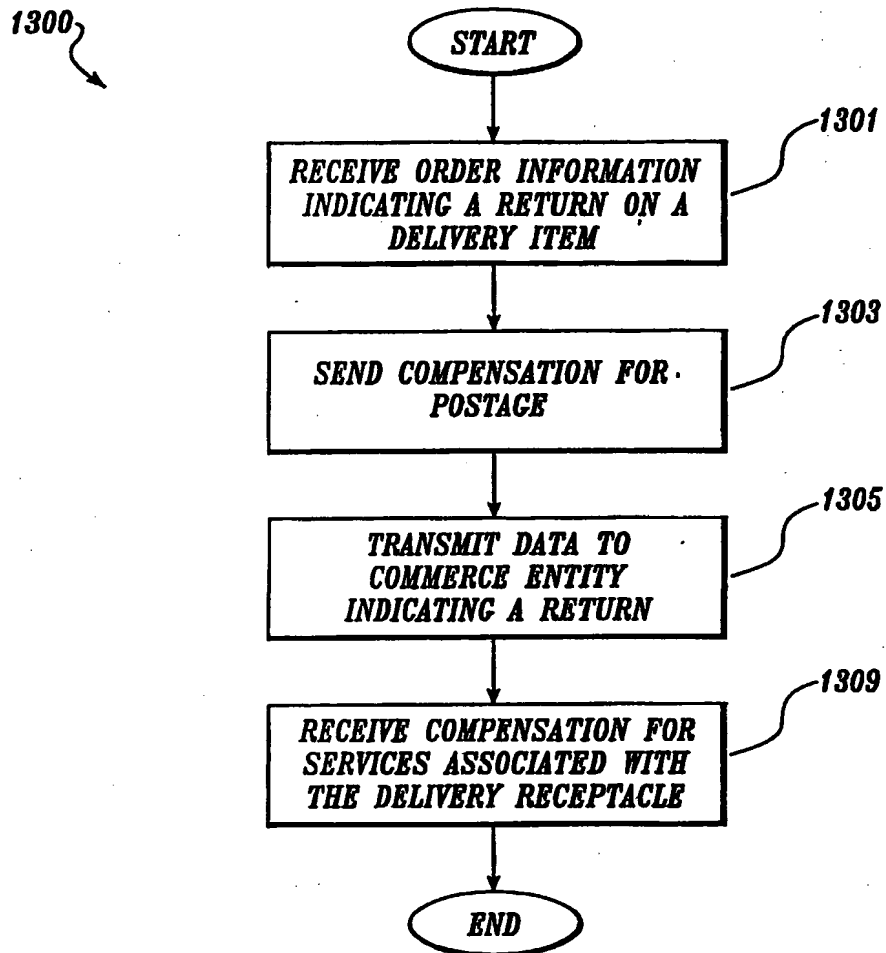
*Fig. 11*

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*Fig. 12*

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*Fig. 13*

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## INTERNATIONAL SEARCH REPORT

Int. Application No  
PCT/US 00/42730

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A47G29/16

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	US 6 204 763 B1 (SONE) 20 March 2001 (2001-03-20) column 4, line 40 - line 43 column 7, line 33 - line 44; figures column 10, line 13	1-4,7,9, 12,18
X	WO 87 06298 A (MCSWEENEY) 22 October 1987 (1987-10-22)  claims 4,5,8; figures	1-5, 7-11,13, 18
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☒ Further documents are listed in the continuation of box C.

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## INTERNATIONAL SEARCH REPORT

Int. Application No  
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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Information on patent family members

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